RANDOM SAMPLES

edited by CONSTANCE HOLDEN

Another Way Cocaine Messes Up the Brain

Researchers at Rockefeller University have found that in rats, a routine of cocaine "bingeing" appears to reduce the activity of a gene that encodes an opioid receptor. "This is the first time" that introduction of a chemical substance has been shown to "regulate the expression of an opioid receptor gene in a living animal," says neurobiologist Mary Jeanne Kreek, head of the Laboratory of the Biology of Addictive Diseases, where the work was done. Kreek says that down the road, this could offer new leverage for treating cocaine addiction.

Many genes are known to be altered, at least temporarily, by drug abuse. George Uhl of the National Institute on Drug Abuse says this one in particular is "an important finding," because it codes for the receptor for the neurotransmitter dynorphin, an endogenous opioid that is "intimately involved" in a kind of "yin-yang" relationship with the dopaminergic system, the brain's principal reward circuit. By that he means that not only does the dopaminergic system stimulate neurons that make dynorphin, but it now appears that the dynorphin system, in turn, acts to inhibit dopamine.

The research team, headed by molecular biologist Rudolph Spangler, established in 1992 that cocaine bingeing in rats leads to an increase in the expression of dynorphin in certain brain regions that are also rich in dopamine neurons. Now the scientists, after administering cocaine to rats over a 14-day period, have found evidence for what Kreek calls "a significant down-regulation" among kappa receptors, which bind dynorphin. Down-regulation is what receptors often engage in to counter an excess of the molecules they are designed to receive.

Kreek says the research, published in the May issue of *Molecular Brain Research*, shows that while the primary action of cocaine is on the dopamine system, the drug also indirectly affects the brain's endogenous opioids and their receptors. That means scientists now have, in addition to sites in the dopaminergic system, two additional ones—dynorphin and its kappa receptors—that could be targets for treatments for cocaine addiction.

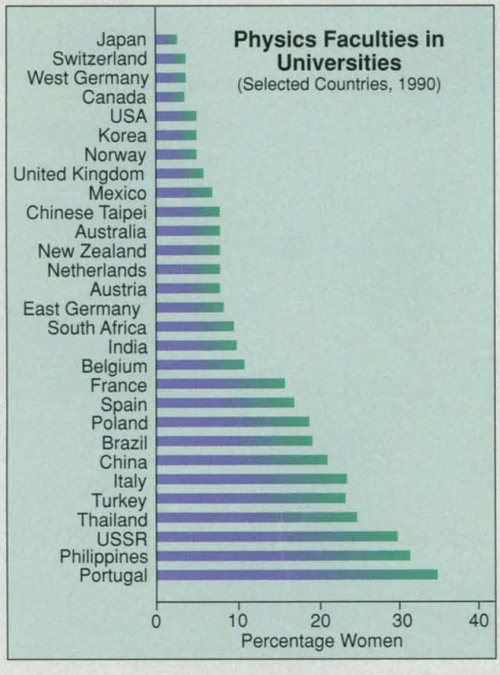
Kreek says one of the biggest questions researchers now want to address is how long these alterations last, and, a crucial issue for the human drug abuser, "what are the events that lead to the point of no return?"

World Women in Science

Women are still greatly underrepresented in both scientific research and policy-making all over the globe, according to a report issued last month from the Paris-based United Nations Educational, Scientific, and Cultural Organization (UNESCO).

The second *World Science Report*, which comes 3 years after the first one, includes a section on "The Gender Dimension of Science and Technology" that details continuing gender disparities in access to scientific education and career opportunities, especially in developing countries. For instance, a recent survey of 10 African universities concluded that women make up only 10 % of the total faculty.

The report also laments the underrepresentation of women on science policy-making bodies—France's Higher Council for Research and Technology, for example, counts only two women among its 40 members, and Egypt's Supreme Ministerial Committee for Science, Research, and Technology comprises one woman and 12 men. The United States comes off a little better: Of the 18 members of the President's Committee of Advisors on Science and Technology, six are women.



UNESCO

"Women are not heavily involved in designing technological and scientific change," says Sandra Harding, co-author of the report's section on women and a professor of philosophy at the University of California, Los Angeles, and the University of Delaware. But "scientific development can't happen as long as women are de-developed."

The 356-page report also looks at scientific infrastructures around the world and discusses ethical questions confronting science. It's available from UNESCO Publishing, 1 rue Miollis, 75732 Paris Cedex 15, for $45.00 or 220 French francs.


S. BRADLEIGH VINSON

Yum. Fire ants attack a corn earworm.

Eavesdropping on Ants

That fire ant mound in the backyard may not just be humming with activity, according to a researcher at the University of Mississippi. Put an ear to the ground, and you might hear the ants talking.

Based on 30 years of research, scientists believed that fire ants communicated mainly via pheromones—chemical messages that signal everything from intruders to "food ahead." Researchers knew the insects also made sounds—a thrumming produced by moving the abdomen up and down—but the function of such noises was unclear. But engineer Robert Hickling recorded these sounds and found that acoustic signals might play a bigger role than previously thought.

Hickling and colleague Wei Wei first recorded the sounds at the request of TV's *ABC News* for a segment on fire ants—feisty aggressors named for the sensation produced by their nasty sting. The researchers inserted a microphone into the ant colony and recorded what they interpreted to be a general alarm signal, because it was followed by a mass attack on the instrument. The scientists also recorded a call made periodically during peaceful times, which Hickling guesses has no obvious effect on behavior except to say that all is well. They heard a different call when ants attacked a caterpillar. And one ant made yet another noise when Hickling trapped its antenna under a container lid. "It's a very plaintive sound," says Hickling, who believes it's a cry for help because other ants soon came running to the scene.

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Tuning In to the *Why Files*

As the tornado season opens in the American Midwest, people with access to the World Wide Web will be able to turn to a new educational resource, *The Why Files*, to find out what's whirling around them. They will be able to get an instant on-line education on twisters, including links to meteorologists and federal disaster agencies.

The tornado feature is just part of what the site, at http://whyfiles.news.wisc.edu, has to offer. The National Institute for Science Education, financed by the National Science Foundation and headquartered at the University of Wisconsin, has designed the *Files* to appeal to both students and teachers and the general public, says Susan Trebach, head of the development team. A new feature story is presented every 2 weeks, keyed to public events. The site also offers a weekly "cool science image"—a satellite image of lightning was a recent example—and a "sports" icon that leads readers to a weekly quiz featuring questions about science and sports.

Trebach says tens of thousands of users have logged in since the site opened in February, and that a British browser of a page on mad cow disease (a.k.a. BSE) wrote in to say that "it explains BSE to both my kids and my wife better than any British newspaper." Other feedback came from a mystery writer in rural Ohio who used a recent forensics feature that explained how forensic entomologists estimate the time of death of corpses from their maggot populations.

Stacie Cassat, who develops Web services at BBN Educational Technologies in Cambridge, Massachusetts, praises the *Why Files* for writing that "is natural, fun to read, and, most important, very concise." But judging from the paucity of messages in its interactive "Forum," she says, most people who find the site are random browsers. "*The Why Files* doesn't have a community yet."

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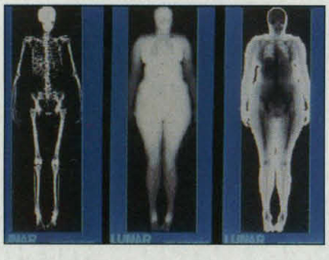
"Ants probably communicate with sounds more than we think they do," says Walter Tschinkel, a biologist at Florida State University. But Tschinkel says he's unconvinced until research shows that ants respond in specific ways to signals from their colony that are played back to them. But the research is a step in the right direction, says Cornell entomologist Tom Eisner: "Let's not poohpooh the discovery that these guys are making different sounds under different situations."

Hickling, who presented his work at the Acoustical Society of America meeting this week, agrees more research needs to be done on the ants' antics. Meanwhile, he is developing a recording system that farmers can use out in the field to listen for crop pests, such as bollworms.

Where's the Beef ... And Fat?

As interest in the health implications of obesity continues to grow, scientists have found that an x-ray procedure designed to study osteoporosis is useful in assessing individual body fat, physiologists reported last month at a Washington, D.C., meeting of the Federation of American Societies for Experimental Biology.

In the procedure, called dual-energy x-ray absorptiometry (DXA), a filter splits an x-ray beam into two different energy levels. As the beams pass through the body, one beam attenuates more than the other depending on the tissue penetrated. By tracking those differences, a computer determines the tissue type.



LUNAR CORP.

Fat tracking. From DXA images of bones *(left)*, soft tissue *(center)*, and both *(right)* come accurate assessments of body fat.

The most traditional fat assessment technique involves pinching the body and measuring the thickness of the folded skin on various parts of the body. But that formula "falls apart" when applied to the elderly or children because it was based on measurements from young adults, says physician Michael Jensen of Mayo Medical School in Rochester, Minnesota.

DXA is both easy to do and "a very powerful method for characterizing fat distribution," says Steven Heymsfield of St. Luke's-Roosevelt Hospital Center in New York City. The radiation exposure is so small that Kenneth Ellis, a medical physicist and clinical investigator at the U.S. Department of Agriculture Children's Nutrition Research Center in Houston, is using DXA in a study of 1000 Black, Caucasian, and Hispanic children, one of the largest ever to assess muscle, bone, and fat development in the first 15 years of life. In the past this kind of monitoring would have been difficult, if not impossible to do, says Ellis.

French Toxic Tiff

The long-running saga of André Cicolella, who was fired for "insubordination" 2 years ago from France's occupational health research agency, has ended in victory for him: A court has awarded him 600,000 francs ($116,000).

Cicolella, a toxicologist, became a cause célèbre after he was sacked from the Institut National de Recherche et de Sécurité (INRS) in Nancy (*Science*, 20 May 1994, p. 1076). The agency said Cicollela was fired because he refused to attend a meeting with his boss, but many of his colleagues believed that the real reason was that higher-ups found him excessively zealous in his pursuit of research on the health effects of glycol ethers, widely used in semiconductor manufacturing and other applications.

Cicolella did skip a meeting called by his boss to discuss a conflict with another researcher over a paper he had co-authored. Cicolella had insisted that the matter be settled by a scientific committee; INRS instead suspended and later fired him. He sued and, on 7 May, a tribunal ruled that he had been unjustly fired. It awarded him damages and interest.

Cicolella now works at the government's industrial health institute, INERIS, just around the corner from his old job at the INRS—and says that although he is glad to have the money, he pursued his case primarily to make a statement about "scientific ethics" and the importance of "protecting public health."

W.M. KECK FOUNDATION

Double vision. The giant Keck Telescope in Hawaii has reigned for 5 years as the world's largest optical telescope. Now it will share that title with an identical twin. On 8 May on Mauna Kea, a dormant volcano on Hawaii's Big Island, officials from three universities, NASA, and the W. M. Keck Foundation dedicated the Keck II Telescope. Like Keck I, 85 meters away, Keck II weighs 300 tons, stands eight stories high, and has a 10-meter mirror made up of 36 hexagons.

"Every field [of astronomy] has been completely revolutionized by" Keck I, says Art Wolfe of the University of California, San Diego, who studies protogalaxies with the telescope. And more delights are to come. Because they gather so much light, the twin Kecks, while not capable of the clarity of the Hubble Space Telescope, are better than Hubble at studying distant galaxies and exploring what makes up dark matter. And in about 4 years' time, when the light the two telescopes collect is combined through an interferometry system (now being designed), they will be able to penetrate the heavens as far as an 85-meter telescope. Mike Shao of NASA's Jet Propulsion Laboratory says NASA plans to use the coupled telescopes as part of a search for Earth-like planets around other stars—and one day, perhaps, "to find, in space, a habitable planet."

The telescope won't be fully operational until October, when it will double the viewing time available at the Keck Observatory and allow a wider range of spectographs and and other special attachments to be used.